

EPA Region 5 Records Ctr.



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Technical Summary of:

**Draft Addendum to Remedial Investigation Report and FS Report
Eagle Zinc Company Site**

Prepared for:

Technical Review Meeting

May 3, 2005

ADDENDUM TO RI REPORT

Objective: Evaluate Potential Long-Term Human Health and Ecological Risks Associated with Residue Piles

- Physical Characterization of Residue Piles
- Sampling/Analysis- Residues and On-Site Soil
- Dispersion Modeling- SCREEN 3
- Soil Deposition Calculations
- Residue Pile Conceptual Site Model
- Human Health Risk Evaluation
- Ecological Risk Screening Evaluation

PHYSICAL CHARACTERIZATION

- Zinc processing slag with particle sizes up to 12 inches or more with/without fine-grained matrix; loose to highly compacted/fused.
- Piles 1-25 feet in height.
- Field forms: Surface areas, degree of crusting, pile surface characteristics, estimates of percent non-erodible elements (percent >1 cm).
- Laboratory particle size analyses conducted for each pile/pile group sampled in Phase 1. Results confirm wide distribution of particle sizes and relatively small silt/clay size fraction (2.0-14.7%; mean-7.4%).

* more larger particles

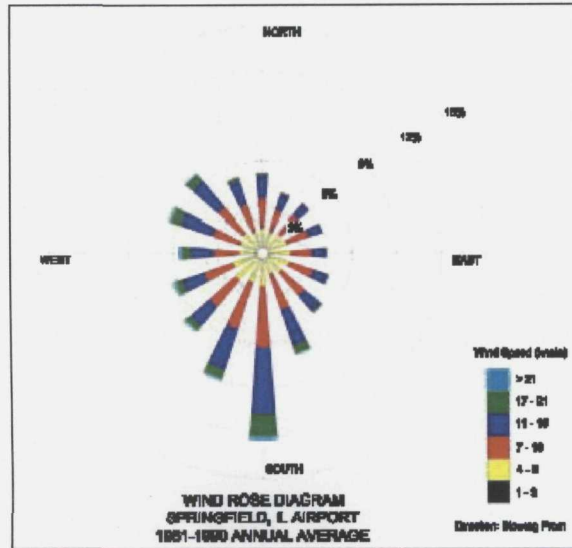




MARCH 2005 SAMPLING/ANALYSIS

- **Residue Piles** - Composite surface samples for TAL metals; one composite of fines fraction ($<75\mu\text{m}$) from all piles also analyzed for TAL metals. Purpose: used in soil deposition calculations and subsequent risk evaluations; used to evaluate risk from direct inhalation of particulates from piles.
- **Soil in Northern Area** - Four surface samples along northern site boundary. Purpose: provide additional surface soil data north (generally down-wind) of the residue piles and manufacturing areas; used in human health risk evaluation.
- **Soil in Areas 1 and 2** (southern part of site) - Five surface samples at locations specified by USEPA. Purpose: provide additional soil data at specific locations immediately adjacent to and down-wind of certain piles; used in human health risk evaluation.

(surface area in sq ft)



EMISSION RATES

- **Determined for particle size ranges ($\leq 30 \mu\text{m}$, $\leq 15 \mu\text{m}$, $\leq 10 \mu\text{m}$, $\leq 2.5 \mu\text{m}$) using AP-42 methodology Chapter 13.2.5 for Industrial Wind Erosion (USEPA 1995/2001).**
- **Conservative threshold friction velocity (uncrusted coal pile) defined for all piles.**
- **Assumed entire pile surface area disturbed once per month; i.e., periodic disturbance or movement of piles considered in emission rate calculations.**
- **Fastest mile values per disturbance obtained from real-time data.**
- **Uniform vs. Non-Uniform Wind Erosion Patterns applied.**
- **Negligible potential for wind erosion where friction velocity was calculated to be less than the fixed threshold friction velocity.**

DISPERSION MODELING

- **Dispersion modeling conducted using SCREEN3 to conservatively estimate particulate emissions from each pile/pile group, for each particle size range.**
- **Emission rates corresponding to 10 μm particle size or less used for the inhalation pathway risk evaluation; 30 μm particle size or less used for the deposition calculations.**
- **Automated receptor grid from 1 meter to 1,610 meters (1 mile).**
- **Regulatory default options used for an area source with worst-case orientation.**
- **Full range of meteorological conditions.**

SOIL DEPOSITION CALCULATIONS

- **Purpose:** To estimate the potential to the upper 6 inches of soil by air deposition.
- **Followed methodology from USEPA's Human Health Risk Assessment Protocol (1999).**
- **Assumptions/Input Values**
 - Used maximum SCREEN3 results from each pile to calculate the deposition flux.
 - Stokes Settling Velocity calculated for particles of 30 μm in diameter.
 - Deposition constant for 30 years.
 - Period of exposure - 70 years.
- **Results used in human health and ecological risk evaluations.**

[HUMAN HEALTH RISK- CSM FOR RESIDUE PILES]

Potential Exposure Medium	Potential Exposure Route	Data Used to Evaluate	Method of Evaluation
Respirable emissions from residue pile	Particle inhalation	Emission/ dispersion modeling, residue analytical data	Metals concentration data from piles compared with pile-specific residue screening levels back-calculated based on USEPA inhalation toxicity criteria, modeled respirable dust concentration, and residential exposure assumptions
Surface soil (residue pile emission deposition modeling)	Particle inhalation Ingestion Dermal contact	Emission/ dispersion/ deposition modeling, residue analytical data	Maximum modeled or measured metals concentrations in soil screened against COPC screening levels (USEPA Region III residential RBCs and Illinois regional background levels), as in the HHRA (see Section II.B of the RI Report).
Surface soil	Particle inhalation Ingestion Dermal contact	Soil data collected March 2005	Results exceeding these COPC screening levels compared to Tier 1 risk-based screening levels for soil developed in the HHRA for on-Site receptors: Commercial/Industrial Workers, Construction Workers, and Trespassers.

HUMAN HEALTH RISK EVALUATION

- **Soil: Modeled Deposition**
 - **Metals of potential concern in soil selected by comparison with COPC screening levels (the higher of available Illinois background levels and EPA Region 3 Risk-Based Concentrations for default residential exposure scenario).**
 - **Maximum modeled concentrations did not exceed these screening levels.**
 - **Conclusion: airborne deposition of residue pile material on local soils would not result in adverse health effects to lifetime residents at maximum deposition points (all of which are on-site).**

~ maximum ~~distance~~
concentration
pts (John?)

HUMAN HEALTH RISK EVALUATION

- **Soil: March 2005 sampling results**
 - **Maximum concentrations of As, Fe, Pb and V exceeded COPC screening levels.**
 - **Metals concentrations were compared with Tier 1 screening levels for on-site receptor scenarios (Commercial/Industrial Worker, Construction Worker, Trespasser):**
 - **All concentrations of Fe, Pb, and V lower than all Tier 1 screening levels**
 - **Two As results exceeded Illinois background (11.3 mg/kg), and all exceeded the Tier 1 Commercial/Industrial Worker screening level (1.8 mg/kg).**
 - **Incorporation of new As data into HHRA database yields As representative concentration (95% UCL) of 8.1 mg/kg (same as in HHRA)**
 - **Conclusion: None of the measured levels of Fe, Pb, and V exceeded Tier 1 screening levels. As in HHRA, “the fact that the representative concentration for arsenic of 8.09 mg/kg is less than the Illinois background concentration of 11.3 mg/kg indicates that this slight exceedance of the target risk level is insignificant.”**

HUMAN HEALTH RISK EVALUATION

- Inhalation of respirable particles emitted from residue piles
 - Residue Pile Screening Levels (RSLs) calculated using equation from USEPA guidance; pile-specific PEFs calculated using modeled 1 hour maximum 10-µm particle concentrations.
 - No measured residue pile metal concentrations exceeded the RSLs.
 - Conclusion: no adverse effects are expected due to the inhalation of particles originating from the residue piles, even if the 1-hour maximum concentration were inhaled constantly for 30 years.

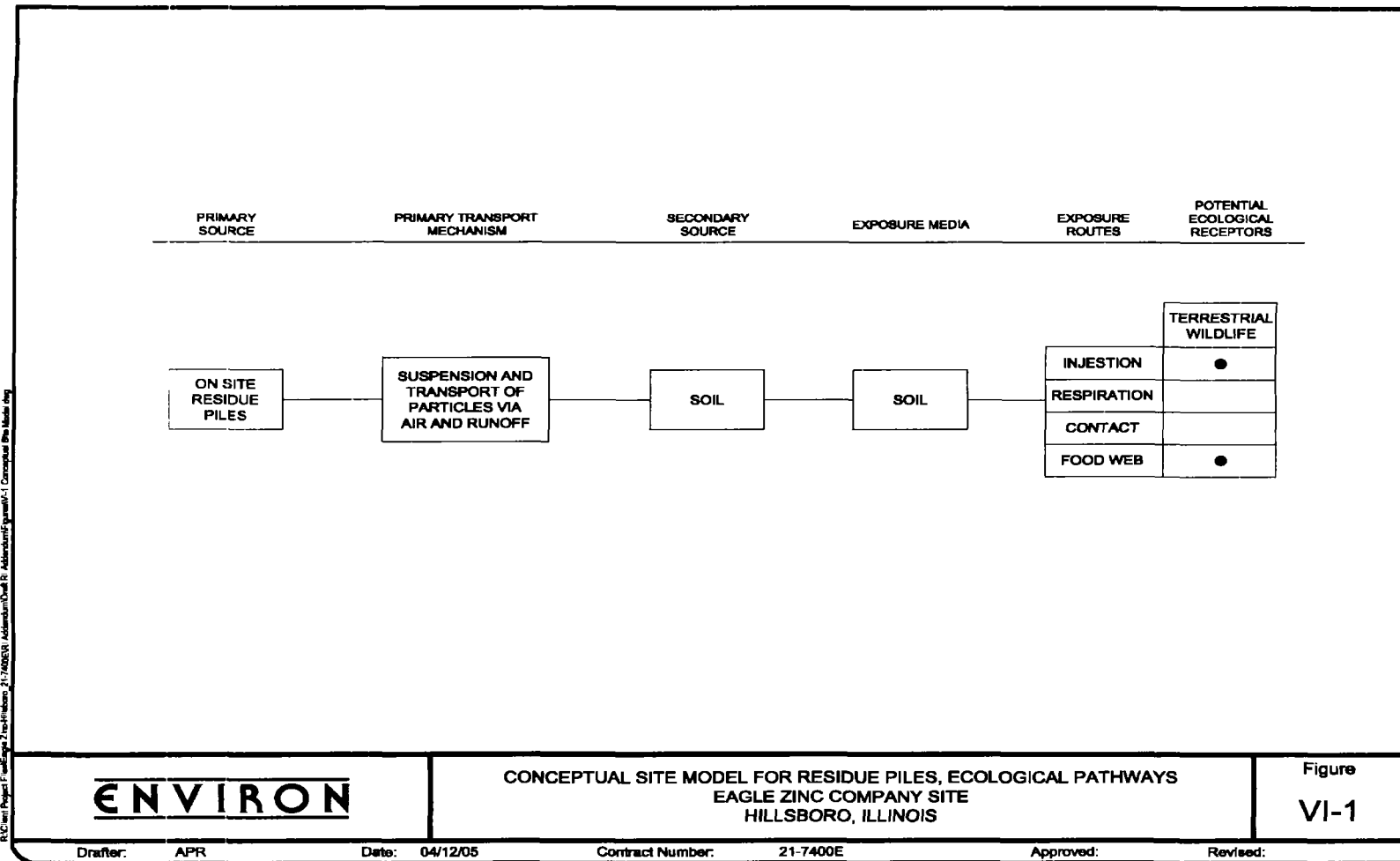
HUMAN HEALTH RISK EVALUATION

- General Conclusions
 - Findings support HHRA conclusion that under current and reasonably anticipated future conditions, the residue piles pose no significant cancer or non-carcinogenic hazard to the receptor populations considered in the HHRA.
 - Potential short-term exposures to workers directly engaged in moving the piles would be managed by standard construction health and safety measures.

moving piles
OSHA ~~stds~~
apply?

~ compare pile results
to soil results

ECOLOGICAL RISK- CSM FOR RESIDUE PILES



ECOLOGICAL RISK EVALUATION

- Conceptual model: Evaluated exposure of terrestrial wildlife to soil via ingestion and food web modeling. Potential transport mechanisms include suspension of dust from residue piles and deposition on soil, and surface runoff.
- Compared maximum modeled soil concentrations to ESVs per methods used in ERSE.
- Of all the HQs calculated for the deer mouse, robin and red-tailed hawk, only one exceeded 1 (a zinc HQ of 7 for the robin; using the average of all modeled zinc concentrations, that HQ is 2).
- Conclusion: Ecological risks to terrestrial receptors are negligible.

piles as is
pile removal - regulated by other laws
spread piles across site
John 1x thinks this is the same as paving the site

BASIS FOR FEASIBILITY STUDY

- RI Conclusions

- HHRA Conclusions: No significant hazard to receptor populations under current and reasonable anticipated future conditions.) *staying w/in conditions of current IC*
- Ecological risks are negligible and further actions are not warranted on the basis of ecological risk.

current IC - only restricts to industrial/commercial

- RI Addendum Conclusions

- Findings support HHRA conclusion that under current conditions, the residue piles pose no significant cancer or non-carcinogenic hazard to the receptor populations considered in the HHRA.
- Ecological risks to terrestrial receptors are negligible.

solid waste mgs
dust emissions Bm practices
worker safety procedures > *these would relate to future use conditions*

FEASIBILITY STUDY ALTERNATIVES

- **No Action** – This response action category serves as a basis against which other remedial actions are compared and may be selected where current and future risks are within acceptable ranges.
- **Institutional Controls** – This response action includes maintenance of administrative controls for restrictions on Site development.

NO ACTION ALTERNATIVE

- Overall Protection of Human Health and the Environment - Since the No Action alternative does not affect future exposure scenarios, it does not address potential future human health and ecological risks.
- Compliance with ARARs - The No Action alternative will not achieve the chemical-specific ARARs and the TBC for this Site.
ILGW quality act *TACO #'s*
- Long-Term Effectiveness and Permanence - The effectiveness and permanence of the No Action alternative are poor based on potential future exposure routes.
- Reduction in Toxicity, Mobility, and/or Volume - The No Action alternative does not result in the reduction of toxicity, mobility, and/or volume.
- Short-term Effectiveness - Short-term effectiveness does not apply to the No Action alternative.
- Implementability - There are no technical or administrative implementability concerns associated with the No Action alternative.
- Cost - There are no costs associated with the No Action alternative.

INSTITUTIONAL CONTROLS ALTERNATIVE

- **Overall Protection of Human Health and the Environment** - The Institutional Controls alternative would provide overall protection of human health and the environment by limiting use of the Site so as to result in no unacceptable risks. The active implementation and enforcement of current conditions and proposed institutional controls will be effective in preventing exposure, either accidental or incidental, to impacted media.
- **Compliance with ARARs** - The Institutional Controls alternative will achieve the chemical-specific ARARs and the TBC for this Site. As chemical concentrations in the surface water from the intermittent drainageways are below the surface water quality standards when the drainageways waters merge with the jurisdictional waters (Lake Hillsboro and the Middle Fork of Shoal Creek), the Institutional Controls alternative meets the TBC for this Site.
- **Long-Term Effectiveness and Permanence** - The Institutional Controls alternative provides long-term effectiveness and permanence as the risk assessment for the Site indicates no unacceptable risk under the industrial/commercial scenario. This scenario will be maintained under the Institutional Controls alternative.

with well ordinance
is a municipal
ordinance
not a recorded
AC for site

INSTITUTIONAL CONTROLS ALTERNATIVE

- **Reduction in Toxicity, Mobility, and/or Volume** - As current and anticipated future industrial/commercial use (including disturbance of the residue piles) show no unacceptable risks, reduction in toxicity, mobility, and/or volume is not necessary for this Site. Implementation of property-specific deed restrictions and institutional controls ensures the current and anticipated Site uses are maintained.
- **Short-term Effectiveness** - The Institutional Controls alternative provides short-term effectiveness as the risk assessment for the Site indicates no unacceptable risk under the industrial/commercial scenario. This scenario will be maintained under the Institutional Controls alternative.
- **Implementability** - There are no anticipated implementability issues with the Institutional Controls alternative.
- **Cost** - Costs for deed recording of the Site Institutional Controls have already been incurred.

COMPARATIVE ANALYSIS

- **Threshold Criteria:** The No Action Alternative was evaluated in the FS, as required by the NCP, but it does not meet both threshold criteria. The Institutional Controls Alternative meets both threshold criteria.
- **Balancing Criteria:** The Institutional Controls alternative also achieves the remaining criteria, while the No Action alternative does not. As such, the Institutional Controls alternative is the preferred alternative.